

STORMWATER MANAGEMENT PLAN

FOR

TM5392RPL3; STP04-050; ER04-18-008

SAN DIEGO, CALIFORNIA

PREPARED FOR:

A & E SWEET HOMES LLC

100 South Anaheim Blvd. suite 360
Anaheim, CA 92805

PREPARED BY:

FEREYDOON ALIPANAH

873 S. Cottontail Lane
Anaheim, CA 92808
Tel: (714) 381-2410

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ACKNOWLEDGMENT AND SIGNATURE PAGE

This Stormwater Management Plan has been prepared under the direction of the following Registered Civil Engineer. The Registered Civil Engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

FEREYDOON ALIPANAH

DATE

TABLE OF CONTENTS

1. Project Description	
1.1. Topography and Land Use	
1.2. Hydrologic Unit Contribution	
2. WATER QUALITY ENVIRONMENT	
2.1 Beneficial Uses.....	
2.1.1. Inland Surface Waters.....	
2.1.2. Groundwater	
2.2. 303(d) Status	
3. CHARACTERIZATION OF PROJECT RUNOFF	
3.1. Existing and Post-Construction Drainage	
3.2. Post-Construction Expected Discharges.....	
3.3. Soil Characteristics	
4. MITIGATION MEASURES TO PROTECT WATER QUALITY	
4.1. Construction BMPs	
4.2. Post-construction BMPs	
4.2.1. Site Design BMPs.....	
4.2.2. Source Control BMPs.....	
4.2.3. Treatment Control BMPs.....	
5. OPERATION AND MAINTENANCE PROGRAM	
5.1. Operations.....	
5.2. Installations	
5.3. Inspection and Maintenance.....	
5.4. Stormwater Maintenance Plan.....	
6. FISCAL RESOURCES.....	
7. SUMMARY/CONCLUSIONS.....	

ATTACHMENTS

- A. Location Map
- B. Project Map
- C. Post Construction BMP Map

APENDIXES

- A. KRISTAR, Flo-Gard + PLUS Filter information

INTRODUCTION

The Stormwater Management Plan (SWMP) requirement is required under the County of San Diego Watershed Protection, Stormwater Management, and Discharge Control Ordinance (section 67.817). The purpose of this SWMP is to address the water quality impacts from the proposed improvements on the A & E Sweet Homes subdivision. Best Management Practices (BMPs) will be utilized to provide a long-term solution to water quality. This SWMP is also intended to ensure the effectiveness of the BMPs through proper maintenance that is based on long-term fiscal planning. The SWMP is subject to revisions as needed by the engineer.

1.0 PROJECT DESCRIPTION

The 1.15-acre property is located on the east side of Sweetwater road in Spring Valley in the County of San Diego (See Attachment 1). The project is approximately 1/4 mile south of Ildika Street. This project will consist of a planned residential community comprising of 10 condominium units. The proposed project will convert 65% of the land into impervious surface.

1.1 Topography and Land Use

The project area is moderately sloping upward, easterly, from Sweetwater road. There is a berm on the West side of the property along Sweetwater Road. The project area which is designated urban is covered with scattered shrubs and is surrounded from three sides by residential units, North multi-family apartments, East single family homes, South Mobil home park and on the West side runs parallel with Sweetwater Road. Currently, the land is undeveloped.

1.2 Hydrologic Unit Contribution

The property is located in the Sweetwater watershed, Sweetwater Hydrologic Unit and in the Hydrologic subarea (909.12). The project drains westerly into an existing temporary drainage ditch located at the toe of existing sound berm. The drainage ditch flows southerly and drains into a 30" CSP drop inlet. This inlet drains into a 24" RCP which carries the flow to an existing RCB that is constructed by Caltrans under the Sweetwater Road. The project area represent 0.004% of the watershed.

2 WATER QUALITY ENVIRONMENT

2.1 Beneficial Uses

The beneficial uses for the hydrologic unit are included in Tables 1.1 and 1.2. These tables have been extracted from the Water Quality Control Plan for the San Diego Basin. MUN - Municipal and Domestic Supply: Includes uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply. AGR - Agricultural Supply: Includes uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

IND - Industrial Services Supply: Includes uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

REC1 - Contact Recreation: Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs.

REC2 - Non-Contact Recreation: Includes the uses of water for recreational involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

WARM - Warm Freshwater Habitat: Includes uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

WILD - Wildlife Habitat: Includes uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife, (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

2.1.1 Inland Surface Waters

Inland Surface waters have the following beneficial uses as shown on table 1.1

Table 1.1 Beneficial Uses for Inland Surface Waters

Hydrologic Unit Number	Mun	Ind	Rec1	Rec2	Warm	Wild
909.12	+	x	0	x	x	x

+ Excepted from Municipal

x Existing Beneficial Use

0 Potential Beneficial Use

2.1.2 Groundwater

Groundwater beneficial uses includes agricultural and potentially municipal and industrial.

Table 1.2 Beneficial Uses for Groundwater

Hydrologic Unit Number	Mun	Agr	Ind
909.12	x	x	x

+ Excepted from Municipal

x Existing Beneficial Use

0 Potential Beneficial Use

2.2 303(d) Status

According to the California 1998 303d list published by the San Diego Regional Water Quality Control Board, there are no impaired waterbodies that are associated with this project.

3 CHARACTERIZATION OF PROJECT RUNOFF

3.1 Existing and Post-Construction Drainage

The proposed project will not significantly alter drainage patterns on the site. Storm water sheet flows westerly into an existing drainage ditch. The drainage ditch also receives storm water from north of the project site via an 18 inch culvert which is under the existing access road. There is also an 8 inch storm drain from the adjacent apartment complex that discharges into the subject property over a rip-rap and then sheet flows into the drainage ditch. The drainage ditch collects all the on-site and off-site storm drain, then flows southerly and passes the property line and drain into a 30 inch CSP drop inlet. The drop inlet drains into a 24 inch RCP which in turn drains into an existing RCB under the Sweetwater Road. It is proposed to remove the existing drainage ditch and replace it with a 24-inch Corrugated Still Pipe (CSP), construct catch basin at the low point of existing access road, construct a junction structure to collect storm water from the proposed catch basin and the 8 inch storm drain run-off, and construct a catch basin at the low point of the west of the property to collect on site storm drain and discharge it into proposed 24- inch CSP.

Stormwater discharge points will not divert runoff from existing conditions. Furthermore, there will not be a substantial increase to the amount of flow. The peak flow rate will increase from 10.1 cfs under the existing condition to 11.6 cfs under the proposed condition.

A CEQA Preliminary Hydrology/Drainage Study That has been submitted to the County of San Diego addresses the analysis of drainage issues for the proposed project .

Post-construction runoff will be directed into a storm drain system. The preliminary design of this system is included in BMP map. Summaries of the post-construction water quality flows are included in table 3.1. The flows were developed using the 85th Percentile Precipitation map developed by the County ,which was obtained from the website <http://www.co.san-diego.ca.us/dpw/land/flood.htm>.

Table 3.1 Post-Construction Water Quality Flows

Outfall	Tributary Area (acres)	Q ₁₀₀ (cfs)	Q _{wq} (cfs)
A-1	0.54	1.9	0.25
A-2	0.11	2.3	0.04
A-3	1.26	5.9	0.58

3.2 Post-Construction Expected Discharges

The project is not expected to generate significant amounts of non-visible pollutants. However, the following constituents are commonly found on similar developments and could affect water quality:

- Sediment discharge due to construction activities and post-construction areas left bare.
- Nutrients from fertilizers
- Trash and debris deposited in drain inlets.
- Hydrocarbons from paved areas.
- Pesticides from landscaping and home use.

3.3 Soil Characteristics

The project area consists of soil group D with a minimum saturated infiltration rate of 6.3 mm/h. The project will not have slopes steeper than 2:1. All slopes will include slope protection for construction and post-construction.

(Note: Information regarding soil conditions is also available in the Soil Survey, San Diego Area, California, US Department of Agriculture, 1973.)

4.0 MITIGATION MEASURES TO PROTECT WATER QUALITY

To address water quality for the project, BMPs will be implemented during construction and post construction.

4.1 Construction BMPs

A detailed description of the construction BMPs will be developed during the Grading Plan and Improvement Plan Engineering. Since the project is in the preliminary development phase only a listing of potential types of temporary BMPs are available. This includes the following:

- Silt Fence
- Fiber Rolls
- Street Sweeping and Vacuuming
- Storm Drain Inlet Protection
- Stockpile Management
- Solid Waste Management

- Stabilized Construction Entrance/Exit
- Dewatering Operations
- Vehicle and Equipment Maintenance
- Erosion Control Mats and Spray-on Applications
- Desilting Basin
- Gravel Bag Berm
- Sandbag Barrier
- Material Delivery and Storage
- Spill Prevention and Control
- Concrete Waste Management
- Water Conservation Practices
- Paving and Grinding Operation
- Permanent Revegetation of all disturbed uncovered areas

4.2 Post-construction BMPs

Pollutants of concern as noted in section 3 will be addressed through three types of BMPs. These types of BMPs are site design, source control and treatment control.

4.2.1 Site Design BMPs

Landscaping of the slopes and common areas are incorporated into the plans. The landscaping will consist of both native and non-native plants. The goal is to achieve plant establishment expeditiously to reduce erosion. The irrigation system for these landscaped areas will be monitored to reduce over irrigation.

4.2.2 Source Control BMPs

Source control BMPs will consist of measures to prevent polluted runoff. This program will include an educational component directed at each homeowner. The homeowners will receive a set of brochures developed by the County's Environmental Health Department. These will include the following:

- Stormwater Runoff Pollution Fact Sheet;
- Stormwater Runoff Pollution Prevention Tips for Homeowners;
- Stormwater Pollution Prevention Yard Work (Landscaping, Gardening, Pest Control);
- Stormwater Pollution Prevention Pet Waste; and
- Stormwater BMP Swimming Pool and Spa Cleaning.

In addition, storm drain inlets will be stenciled with a message warning citizens not to dump pollutants into the drains.

4.2.3 Treatment Control BMPs

A Catch Basin Insert is proposed to be used to address water quality for this project. It will be used to treat contaminated water before it enters the drainage system. Flo-Gard +PLUS manufactured by KriStar Enterprises, Inc. which is approved by the County of San Diego is recommended for this project. This product contains an EPA- approved

material that collects petroleum hydrocarbons and other contaminants while allowing for undisturbed passage of water.

A Flo-gard + PLUS filtration system manufactured by KriStar Corporation is introduced in appendix A. Information regarding design, installation, maintenance and maintenance activities, maintenance options, site-specific requirements is provided in manufacturer literature.

DESCRIPTION

A catch basin insert is any device that can be inserted into an existing catch basin design to provide some level of runoff contaminant removal. Currently, there are many different catch basin insert models available, with applications ranging from trash and debris removal to carbon adsorption of aliphatic and aromatic hydrocarbon and heavy metal removal. Costs vary widely, ranging from about \$40 for a simple screen bag, to over \$3000 for more complex, custom-engineered units. The most frequent application for catch basin insert is for reduction of sediment, oil, and grease levels in stormwater runoff. These catch basin insert should also have an overflow outlet, through which water exceeding the treatment capacity can escape without flooding the adjacent area.

ADVANTAGES

1. Provides moderate removal of larger particles and debris as pretreatment.
2. Low installation costs.
3. Units can be installed in existing traditional stormwater infrastructure.
4. Ease of installation.
5. Requires no additional land area.

LIMITATION

1. Vulnerable to accumulated sediments being resuspended at low flow rates.
2. Severe clogging potential if exposed soil surfaces exist upstream.
3. Maintenance and inspection of catch basin insert may be required before and after each rainfall event, excessive cleaning and maintenance.
4. Available head to meet design criteria.
5. Dissolved pollutant are not captured by filter media.
6. Limited pollutant removal capabilities.

DESIGN CRITERIA

1. Calculate the flow rate of stormwater to be mitigated by the catch basin insert using Principle 8: Design to Treatment Control BMP Standards in the County of San Diego Standard Urban Stormwater Mitigation Plan Guidance Manual.
2. Insert device selected should be best Available technology for removing constituents of concern for the particular site.

REFERENCES

1. The Center for Watershed Protection, Environmental Quality Resources and Loiderman Associates. 1997. Maryland Stormwater Design Manual. Prepared for: Maryland Department of the Environment. Baltimore, MD.
2. DEQ Storm Water Management Guidelines, Department of Environmental Quality, State of Oregon.
<http://waterquality.deq.state.or.us/wq/groundwa/swmngmtguide.htm>
3. K. H. Lichten, June 1997. Compilation of New Development Stormwater Treatment Controls in the San Francisco Bay Area. Bay Area Stormwater management Agencies Association, San Francisco, CA.

5. Operation, Installation, and Maintenance Program

The operation, installation, and maintenance requirement of Flo-Gard+PLUS is briefly described below and in more details in manufacture literature in appendix A.

5.1 Operations

- It is designed to capture sediment, debris, trash, oil and grease from water runoff.
- It can be used anywhere there is a possibility of hydrocarbon contamination.
- The water flows first into a basin where sediment, silt and other debris are collected. Then it flows through the filter skirt, on to the fossil rock adsorbent where the contaminant are removed, and then into the drainage system.
- The fossil rock absorbent used in the filter removes the contaminants from the water through a process called adsorption (like a magnet) rather than absorption (like a sponge).

5.2 Installation

Refer to manufactures installation guide in appendix A

5.3 Inspection and maintenace

The Flo-Gurd+Plus requires periodic inspection and all foreign objects (leaves, cans, cigarettes butts, papers, etc....) removed. The area around the inlet should be swept on a regular bases. The adsorbent midium should be inspected and replaced if the surface is more than 50% coated with contaminats and/ or the unit has become clogged with silt or sediment. To insure efficiency, it is recommended that, as a minimum, the units be inspected at least three times per year (i.e. once before and twice during rainy season). In areas subject to excecutive debris, the inspection should be done more frequently.

5.4 Stormwater Maintenance Plan

The effectiveness of the Stormwater Management Plan (SWMP) relies partially on maintenance of any Structural Treatment BMPs proposed for a project. The County Watershed Protection, Storm Water Management, and Discharge Control Ordinance

obligates dischargers, and owners and occupants of land to maintain all structural treatment BMPs that are part of their project. The Stormwater Maintenance Plan (SMP) describes the responsibilities for the care and upkeep of these Permanent Best Management Practices (BMPs). Improper or inadequate maintenance of this type of BMP could impact storm water and receiving water quality. The SMP is the component of the SWMP that describes:

- The program to maintain Permanent Structural Treatment BMPs including frequency and type of maintenance, safety precautions, and reporting/record keeping.
- The program to implement maintenance of these BMPs may be included as part of other ongoing maintenance activities for the project.
- Maintenance activities must include information and responses concerning potential storm water pollution from accidental spills, illicit connections, illegal discharges and illegal dumping within the Structural Treatment BMPs.
- On-going funding for the proposed maintenance activities

Structural Treatment BMPs that must be maintained include:

- Biofilters (Grass swale, Grass strip, Wetland vegetation swale, or Bioretention)
- Detention Basins (Extended/dry detention basin with grass lining or impervious lining)
- Infiltration BMP (basin, trench)
- Wet Ponds and Wetlands (Permanent pool, Constructed wetland)
- Storm Drain Inserts, Oil/Water separator, Catch basin insert & screens.

These Structural BMP's have been grouped into four category. Maintenance, Mechanism, and funding source for each category is outlined in Table 5.1 extracted from County of San Diego website <http://www.sdcountry.ca.gov/dpw/stormwater/maintenance.htm>

The BMP proposed for this project falls into category II.

Table 5.1

>>>>>>>>>> Increased risk, complexity, cost or other maintenance factors>>>>>>>>>>>>>>>>>>>>				
(Private Responsibility)			(Public Responsibility)	
	<i>First Category</i>	<i>Second Category</i>	<i>Third Category</i>	<i>Fourth Category</i>
Importance of Maintenance	Minimal concern; inherent in BMP or property stewardship	Need to make sure private owners maintain, and provide County ability to step in & perform maintenance	Warrants Flood Control Dist. (FCD) assuming responsibility, with funding related to project	Broader public responsibility for maintenance and funding (beyond project)
Typical BMPs	Biofilter (Grass swale, grass strip, vegetated buffer); Infiltration basin/trench	[First cat. plus:] Minor wetland swale; Small detention basin; Single storm drain insert / Oil-water separator / Catch basin insert & screen	[Second cat. plus:] Wetland swale or bioretention; Detention basin (extended/dry); Wet ponds & wetlands; Multiple storm drain inserts; Filtration Systems	[Third cat. plus:] Retrofit public storm drain inserts, etc. Master plan facility that serves area larger than project
Mechanisms	1. Stormwater Ordinance ¹ requirement [section 67.819(a)&(b)], with code enforcement 2. Nuisance abatement with costs charged back to property owner 3. Condition in ongoing permit such as a Major Use Permit (if project has MUP) 4. Notice to new purchasers [67.819(e)] 5. Subdivision public report "white papers" to include notice of maintenance responsibility 6. Recorded easement agreement w/covenant binding on successors		1. Dedication to FCD. 2. Formation of benefit area 3. FCD maintenance documentation	1. Dedication to FCD or County. 2. FCD / County maintenance documentation
Funding Source(s)	None necessary	Security (Cash deposit, Letter of Credit, or other acceptable to County) for interim period. Agreement for security to contain provisions for release or refund, if not used.	Start-up interim: Developer fee covering 24 months of costs Permanent: FCD Assessment per FCD Act Sec 105-17.5	Varies: gas tax for BMP in road ROW, Transnet for CIP projects, Special funding or General funding for others.

SECOND CATEGORY:

The County needs to assure ongoing maintenance. The nature of the proposed BMPs indicates that it is appropriate for property owners to be given primary responsibility for maintenance, on a perpetual basis (unless a stormwater utility is eventually formed). However, the County (in a "backup" role) needs to be able to step in and perform the maintenance if property owner fails, and needs to have security to provide funding for such backup maintenance. Security for "backup" maintenance after the interim period (5 years) would not be provided, however primary owner maintenance responsibility would remain. If a stormwater utility or other permanent mechanism is put into place, it could assume either a primary or backup maintenance role.

Typical BMPs:

- Biofilters (Grass swale, Grass strip, Minor wetland vegetation swale)
- Small Detention Basins (Extended/dry detention basin)
- Infiltration BMP (basin, trench)
- Single Storm Drain Inserts, Oil/Water separator, **Catch basin insert & screens.**

Mechanisms to Assure Maintenance:

1. Stormwater Ordinance Requirement: The County of San Diego Watershed Protection, Stormwater Management, and Discharge Control Ordinance (S.O.) requires this ongoing maintenance. In the event that the mechanisms below prove ineffective, or in addition to enforcing those mechanisms, civil action, criminal action or administrative citation could also be pursued for violations of the ordinance.

2. Public Nuisance Abatement: Under the S.O. failure to maintain a BMP would constitute a public nuisance, which may be abated under the Uniform Public Nuisance Abatement Procedure. This provides an enforcement mechanism additional to the above, and would allow costs of maintenance to be billed to the owner, a lien placed on the property, and the tax collection process to be used.

3. Notice to Purchasers. Section 67.819(e) of the SO requires developers to provide clear written notification to persons acquiring land upon which a BMP is located, or others assuming a BMP maintenance obligation, of the maintenance duty.

4. Conditions in Ongoing Land Use Permits: For those applications (listed in SO Section 67.804) upon whose approval ongoing conditions may be imposed, a condition will be added which requires the owner of the land upon which the stormwater facility is located to maintain that facility in accordance with the requirements specified in the SMP. Failure to perform maintenance may then be addressed as a violation of the permit, under the ordinance governing that permit process.

5. Subdivision Public Report: Tentative Map and Tentative Parcel Map approvals will be conditioned to require that, prior to approval of a Final or Parcel Map, the

subdivider shall provide evidence to the Director of Public Works, that the subdivider has requested the California Department of Real Estate to include in the public report to be issued for the sales of lots within the subdivision, a notification regarding the maintenance requirement. (The requirement for this condition would not be applicable to subdivisions which are exempt from regulation under the Subdivided Lands Act, or for which no public report will be issued.)

6. BMP Maintenance Agreement with Easement and Covenant: An agreement will be entered into with the County, which will function three ways:

- (a) it will commit the land to being used only for purposes of the BMP;
- (b) it will include an agreement by the landowner, to maintain the facilities in accordance with the SMP (this obligation would be passed on to future purchasers or successors of the landowner, as a covenant); and
- (c) it will include an easement giving the County the right to enter onto the land (and any necessary adjacent land needed for access) to maintain the BMPs.

This would be required of all applications listed in SO Section 67.804. In the case of subdivisions, this easement and covenant would be recorded on or prior to the Final or Parcel Map.

Funding:

Developer would provide the County with SECURITY to back up the maintenance agreement, which would remain in place for an interim period of 5 years. The amount of the security would equal the estimated cost of 2 years of maintenance activities. The security can be a Cash Deposit, Letter of Credit or other form acceptable to the County.

Cost:

The cost of maintenance for the proposed catch basin insert is about \$600 per year and home owners will bear the cost through home owners association.

7.0 SUMMARY/CONCLUSIONS

This SWMP has been prepared in accordance with the Watershed Protection, Stormwater Management, and Discharge Control Ordinance and the Stormwater Standards Manual. This SWMP has evaluated and addressed the potential pollutants associated with this project and their effects on water quality. A summary of the facts and findings associated with this project and the measures addressed by this SWMP is as follows:

The beneficial uses for the receiving waters have been identified. None of these beneficial uses will be impaired or diminish due to the construction and operation of this project.

This project will not significantly alter drainage patterns on the site. The discharge points will not be changed

Open areas and slopes will be landscaped to reduce or eliminate sediment discharge.

The proposed construction and post-construction BMPs address mitigation measures to protect water quality and protection of water quality objectives and beneficial uses to the maximum extent practicable.

ATTACHMENT

A

LOCATION MAP

ATTACHMENT

B

PROJECT MAP

ATTACHMENT

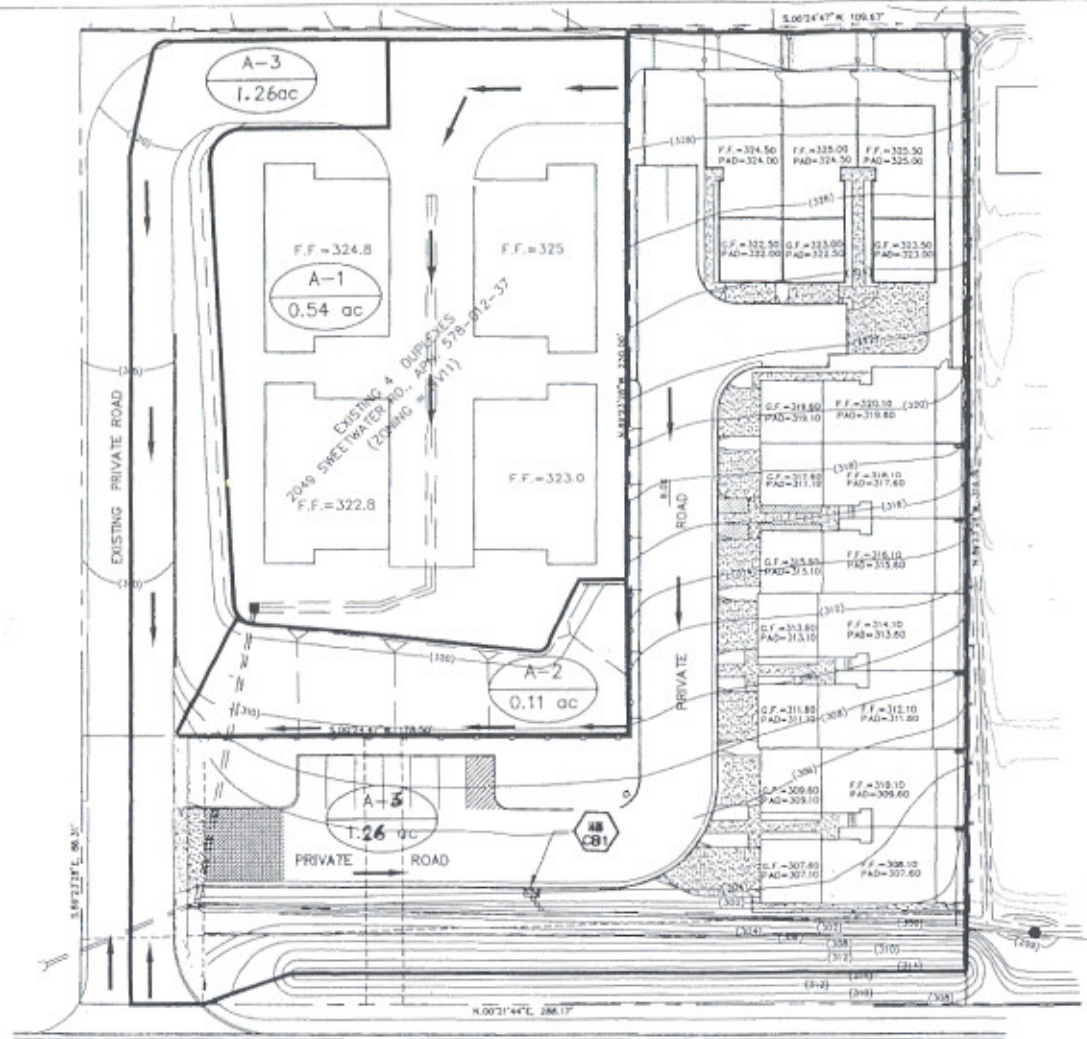
C

POST CONSTRUCTION BMP MAP

APPENDIX

A

KRISTAR, FLO-GARD+PLUS FILTER INFORMATION



LEGEND:

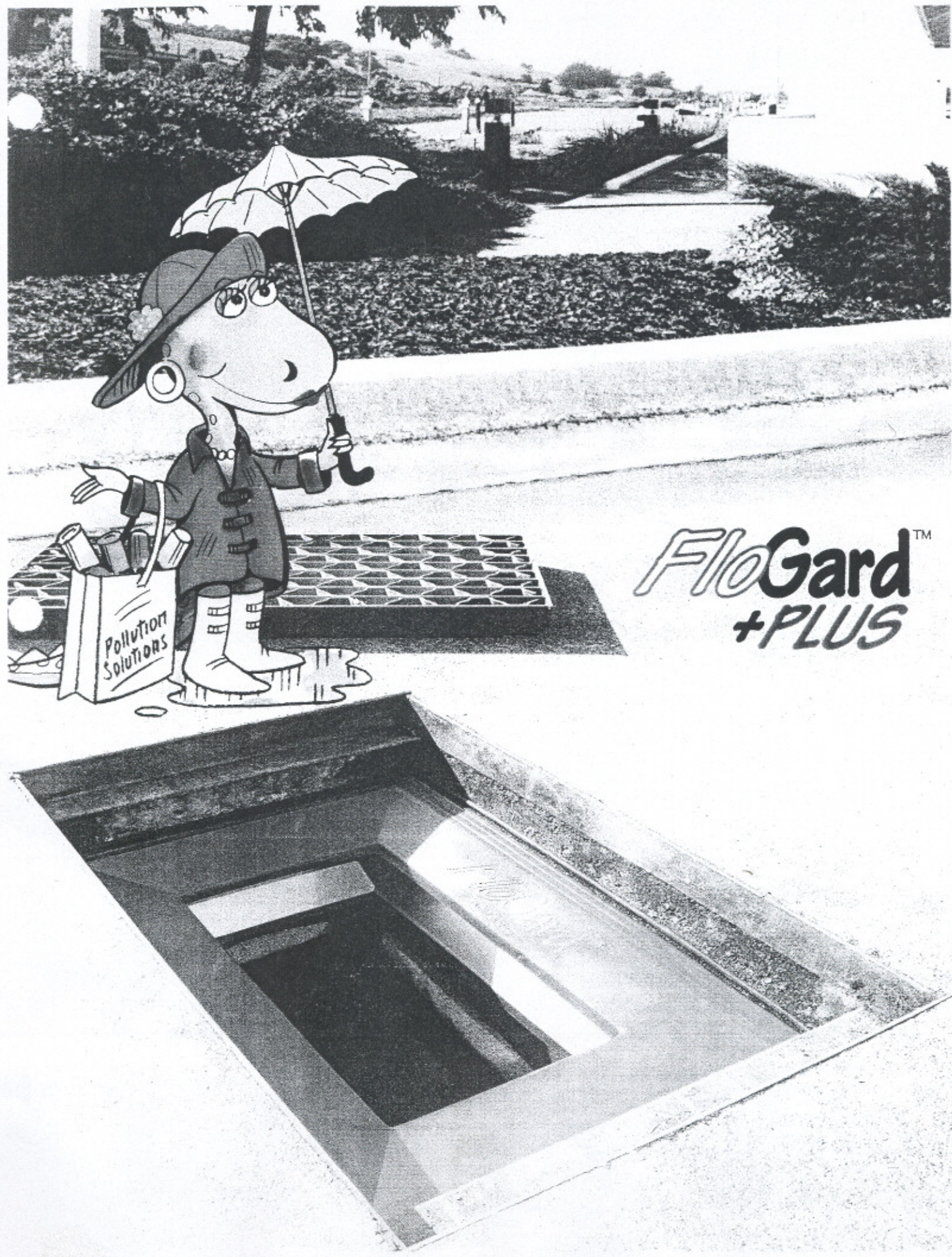


CATCH BASIN INSERT

COUNTY OF SAN DIEGO
POST CONSTRUCTION BMP
 (PROPOSED)
 TENTATIVE TR. 5392

NOT TO SCALE

SHEET 1 OF 1



*Flo*Gard™
+PLUS

Unparalleled stormwater capture capability

HDPE adapter ring
(cut to fit catch
basin ID) allows
for usage in a
wide range of
sizes and styles

Debris trap

"Ultimate"
high-flow
bypass

Initial
"Filtering"
high-flow
bypass

Stainless steel
construction
assures long
service life

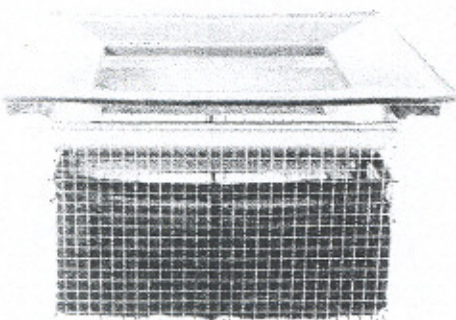
Filter liner is
effective in the
collection of
sediment, debris
and trash without
the retention of
water

FloGard+PLUS™
is the most
effective and
flexible catch
basin filtration
system available
today.

This is a typical collection from the FloGard+PLUS™. In this pile can be found trash we all see daily, lying in gutter, along the side of the highway, and in parking lots. What we don't readily see is the organic material that is also present here. This material goes mostly unnoticed, yet it is as great a polluter and probably more harmful to the environment than that plastic bottle discarded by an inconsiderate person. Grass clippings, shrubbery trimmings, or any other organic material that we fertilize or spray with pesticides and herbicides becomes a potentially deadly pollutant for aquatic life forms. FloGard+PLUS™ is designed to collect these potential pollutants PLUS harmful hydrocarbons (grease and oil) that have become an unfortunate part of our daily lives. PLUS it will do so at a low installation cost and a low maintenance cost. Help keep these piles off our beaches. Use FloGard+PLUS™.

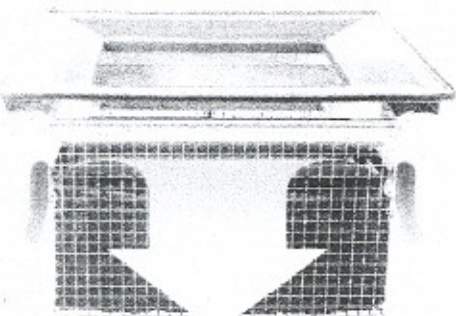


No restriction ... in even the heaviest flows



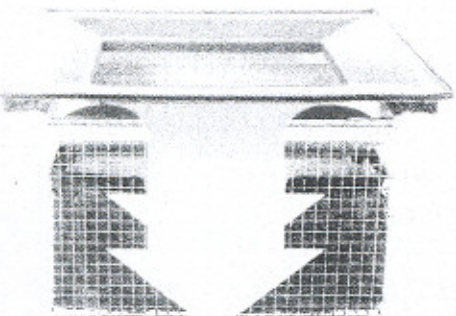
Filtering Flow

FloGard+PLUS™ is designed to capture sediment, debris, trash and oils/grease during low (first flush) flows.



Initial "Filtering" High-Flow Bypass

The FloGard+PLUS™ "Filtering" High-Flow Bypass allows higher flows to bypass the device while retaining sediment and larger floatables (debris and trash).



"Ultimate" High-Flow Bypass

This unique feature of the FloGard+PLUS™ allows sustained maximum design flows under extreme weather conditions or when full containment has been met, while continuing to retain collected pollutants.

Effective pollutants capture with dual bypass features means that FloGard+PLUS™ will effectively filter stormwater runoff but NEVER impede maximum design flows.

"Drop-In" Frame Mount Design

FloGard+PLUS™ is also available in a frame mount design to fit most industry-standard drains. The frame mount model offers the same effective filtering capacity and dual bypass features in a "drop-in" design.



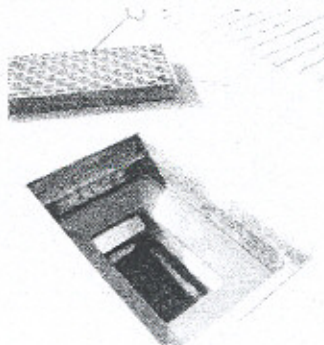
As easy to install as 1 ... 2 ... 3



STEP 1 – Remove the catch basin grate and measure the inside dimensions. Cut the adapter ring to fit. Molded guides make this step easy.



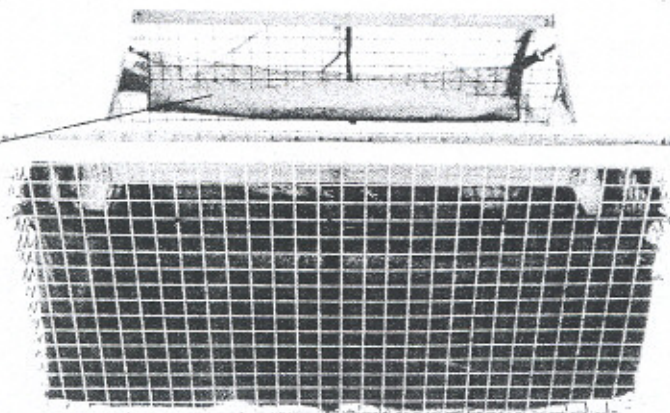
STEP 2 – Install wall mount brackets and set FloGard+PLUS™ into place.*



STEP 3 – Place the adapter ring into the catch basin, resting it on the FloGard+PLUS™. How much easier can it be!

Additional features of FloGard+PLUS™

Clip-in pouches of FOSSIL ROCK™ are available for the collection of hydrocarbons.



The mounting bracket facilitates easy installation in irregular catch basins. At the same time the bracket creates a measured support for the adapter ring. This pre-measured dimension creates the "Ultimate" high-flow bypass area.

*The pictured instructions show the installation of a wall mounted device for non-standard drains. FloGard+PLUS™ is also available in frame mount designs and for combination and curb opening style catch basins.

Go with
"The Flo"™



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KRISTAR ENTERPRISES, INC.

Flo-Gard & Flo-Gard PLUS Catch Basin Insert Filters

FEATURES AND BENEFITS

Feature

Benefit

Stainless Steel Construction

Insures longer service life, even in highly corrosive environments, such as coastal areas, which reduce or eliminate replacement and repair costs.

Corrosion resistant materials will not add pollutants to the waterways.

Note: Corroding metals add to the pollutant load and are likely to be hazardous to aquatic life.

Superior Filtering Flow Rates

Flo-Gard PLUS insert filters offer the highest filtering flow rates available for catch basin insert filters thereby eliminating the need for larger or non-standard drainage inlets.

Unique "Dual Bypass" Design

Flo-Gard PLUS is the only catch basin insert filter system with a "dual" high flow bypass feature. The "initial" high flow bypass allows for the continued capture of floatable pollutants (debris and trash) during moderate to high flows and the "ultimate" bypass assures against clogging of the storm drain system, even during the highest flows.

Note: The "ultimate" high flow bypass also protects against clogging, even if the system is not maintained.

Woven Filter Cloth Liner

Flo-Gard products are produced with a unique woven geotextile filter liner that offers superior capture of finer sediments without the retention of water between storm events.

Effective Filter Medium

Flo-Gard and *Flo-Gard PLUS* insert filters are delivered with *Fossil Rock*, an adsorbent filter medium for the effective removal and retention of oil and grease as well as other non-soluble pollutants normally found in stormwater runoff.

Fossil Rock is furnished in easy to install "clip-in" pouches, which simplifies the replacement and reduces maintenance costs.

The unique filter medium pouch design offers effective "flow-through" filtration during lower flows and "skimmer" filtration for continued effective removal of remaining floatable (free) oils during higher flows.

Fossil Rock pouches separate oil and grease from the collected solids (sediment, debris) which simplifies and thereby reducing costs of disposal.

Note: This important feature allows for the disposal of collected solids (sediment, debris and trash) as a non-hazardous material which allows for disposal in a landfill and provides for reduced disposal costs.

Fossil Rock is non-hazardous, non-biodegradable and non-leaching which allows it to be disposed of at landfills.

Superior Storage Capacity

Flo-Gard Plus offers maximum storage capacity for pollutants which reduces the cleaning frequency thereby reducing maintenance costs.

Flexible Design

Flo-Gard and *Flo-Gard PLUS* inserts are available in shapes and sizes to fit virtually all new or existing drainage system catch basins. They are available for either "frame" or "wall" mounting.

Frame mount designs allow for easy "drop in" installation for the most common size catch basins and the **Flo-Gard Plus** wall mount models are easily installed into even the most odd-shaped or odd-sized catch basins.

Note: Flo-Gard PLUS is ideal for retrofit applications or in situations where exacting catch basin dimensions are not known.

Low Cost

Flo-Gard insert filters are the most effective and economical stormwater treatment systems currently available, allowing property owners and managers to achieve compliance within the constraints of even the smallest budgets.

Maintenance Program

Through **Drainage Protections Systems (DPS)**, our maintenance division, KriStar Enterprises is able to offer the most comprehensive and economical maintenance programs available.

A **DPS** maintenance program will keep your installed filtration system at its peak performance level and will assure continued compliance with regulations.

Industry Leading Warranty

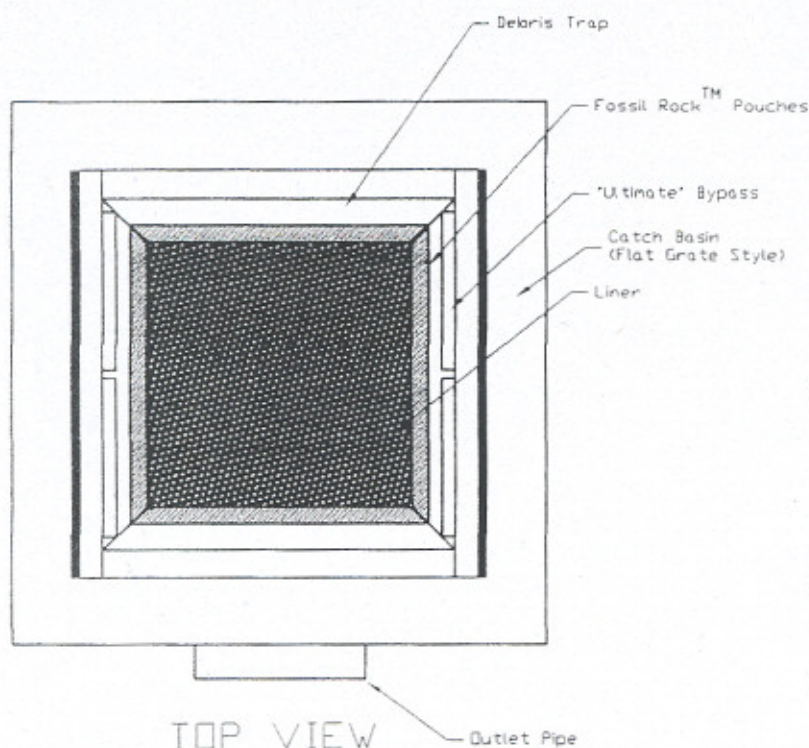
Durable and efficient products allow KriStar Enterprises to offer an industry leading warranty program, reducing ongoing costs.

DPS customers are assured years of effective filtration without worry of failed system components. Call your local **DPS** representative for details or call **DPS** direct at (888) 950-8826.

KRISTAR'S FLO-GARD CATCH BASIN INSERTS

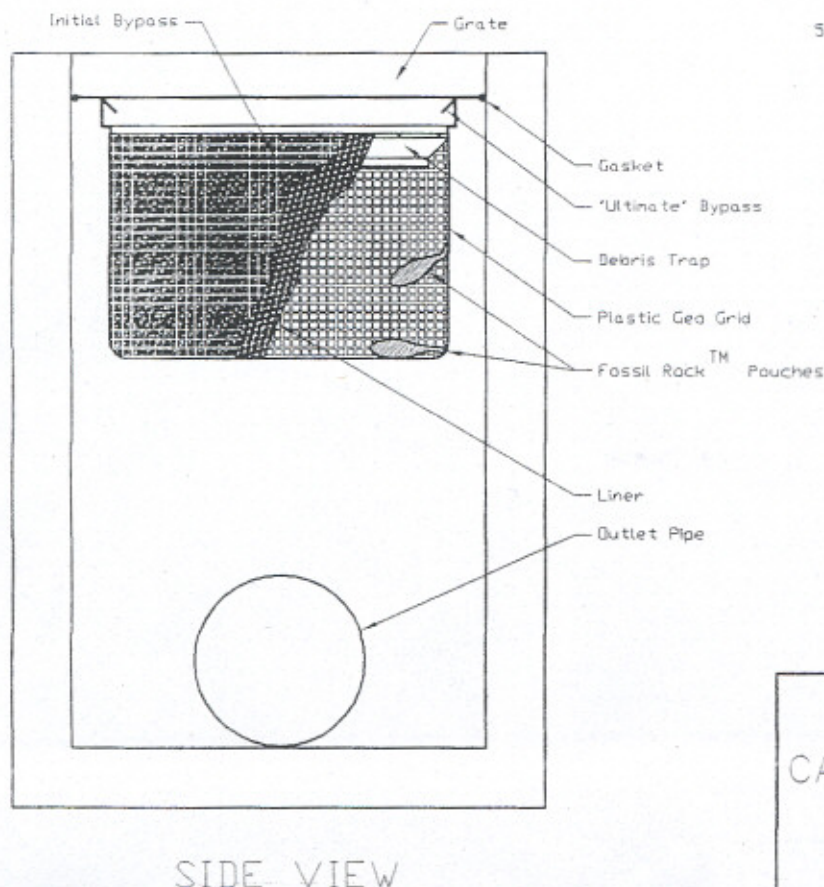
Product Descriptions and Applications

KRISTAR'S PRODUCT	DESCRIPTION	APPLICATION
Flo-Gard+PLUS	<p>A multipurpose catch basin insert designed to capture sediment, debris, trash & oils/grease from low (first flush) flows.</p> <p>A (dual) high flow bypass allows flows to bypass the device while retaining sediment and larger floatables (debris & trash) AND allows sustained maximum design flows under extreme weather conditions</p>	<p>For areas with low to higher than normal sediment, trash, debris and moderately high levels of petroleum hydrocarbons such as parking lots as well as public and private streets.</p> <p>Use in all areas where depth of drainage system allows.</p>
Flo-Gard Insert	A multi-model flexible-catch basin insert designed to collect silt, debris and petroleum hydrocarbons from water runoff.	<p>Vehicle parking lots, aircraft ramps, corporation, truck and bus storage yards, subject to low to moderate levels of sediment, debris and petroleum hydrocarbons.</p> <p>Use for shallow applications</p>
Flo-Gard Supplemental Insert	Hard surfaced vehicle parking lots with curb opening inlets or areas served by trench drains.	A removable, flexible body device designed for curb opening inlets without grates or trench drain installations.

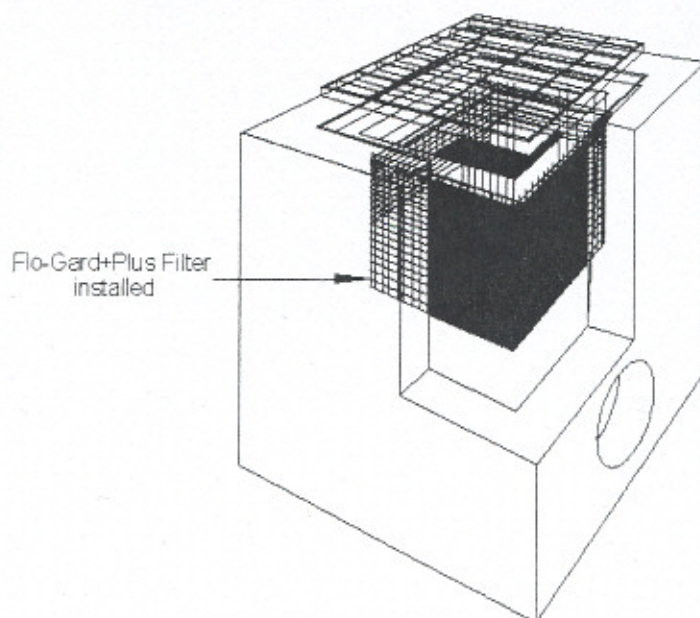


NOTES:

1. FLOGARD+PLUS™ (frame mount)
high capacity catch basin inserts are available in sizes to fit most industry-standard catch basin sizes and styles (see specifier chart). Refer to the FLOGARD+PLUS™ (wall mount).
2. Filter insert shall have both an 'initial' filtering bypass and 'ultimate' high-flow bypass feature.
3. Filter assembly shall be constructed from stainless steel (type 304).
4. Allow a minimum of 2'-0" of clearance between the bottom of grate and top of inlet or outlet pipe(s). Refer to the FLOGARD™ insert for 'shallow' installations.
5. Filter medium shall be FOSSIL ROCK™ installed and maintained in accordance with manufacturer recommendations.



FLOGARD+PLUS™
CATCH BASIN FILTER INSERT
(FRAME MOUNT)
FLAT GRATED INLET
SHEET 2 OF 2
KriStar Enterprises, Inc., Santa Rosa, CA
(800) 579-8819



Model No.	Inlet ID (in x in)	Grate OD (in x in)	Solids Storage Cap. (cu ft)	Filtered Flow (cfs)	Initial Bypass Cap. (cfs)	Secondary Bypass Cap. (cfs)	Total Bypass Cap. (cfs)
FGP-12F	12 x 12	14 x 14	0.3	0.4	2.7	0.1	2.8
FGP-1530F	15 x 30	16 x 36	2.3	1.6	6.5	0.4	6.9
FGP-16F	16 x 16	18 x 18	0.8	0.7	4.4	0.2	4.7
FGP-18F	18 x 18	20 x 20	0.8	0.7	4.4	0.2	4.7
FGP-1822F	20 x 24	18 x 22	2.1	1.4	5.6	0.3	5.9
FGP-1824F	16 x 22	20 x 24	1.5	1.2	4.8	0.2	5.0
FGP-1836F	18 x 36	18 x 40	2.3	1.6	6.5	0.4	6.9
FGP-2024F	20 x 24	22 x 24	1.2	1.0	5.6	0.3	5.9
FGP-21F	22 x 22	24 x 24	2.2	1.5	5.8	0.3	6.1
FGP-2142F	21 x 42	26 x 42	4.3	2.4	8.7	0.4	9.1
FGP-24F	24 x 24	26 x 26	2.2	1.5	5.8	0.3	6.1
FGP-2436F	24 x 36	24 x 40	3.4	2.0	7.5	0.4	8.0
FGP-2445F	24 x 45	26 x 47	4.4	2.4	8.9	0.4	9.3
FGP-2448F	24 x 48	26 x 48	4.4	2.4	8.9	0.4	9.3
FGP-28F	28 x 28	30 x 30	2.2	1.5	5.8	0.5	6.3
FGP-30F	30 x 30	30 x 34	3.6	2.0	7.5	0.5	8.1
FGP-36F	36 x 36	36 x 40	4.6	2.4	8.6	0.5	9.1
FGP-3648F	36 x 48	40 x 48	6.8	3.2	10.8	0.6	11.5
FGP-48F (2 pc)	48 x 48	48 x 52	9.5	3.9	12.5	0.7	13.2

NOTES:

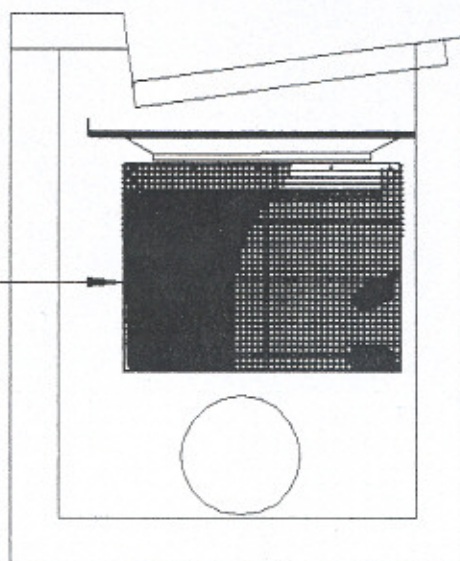
1. Storage capacity reflects 80% of maximum solids collection prior to impending filtering bypass.
2. Filtered flowrate includes a safety factor of 2.
3. Flo-Gard+Plus Catch Basin Filter Inserts are available in the standard sizes (see above) or in custom sizes. Call for details on custom size inserts.
4. Flo-Gard+Plus filter inserts should be used in conjunction with a regular maintenance program. Refer to manufacturer's recommended maintenance guidelines.

U.S. PATENT PENDING

FLO-GARD™ +PLUS
CATCH BASIN FILTER INSERT
 (Frame Mount)
FLAT GRATED INLET
SHEET 1 OF 2

KriStar Enterprises, Inc., Santa Rosa, CA (800) 579-8819

Flo-Gard+Plus Filter
installed



Model No.	Inlet ID (in x in)	Grate OD (in x in)	Solids Storage Cap. (cu ft)	Filtered Flow (cfs)	Initial Bypass Cap. (cfs)	Secondary Bypass Cap. (cfs)	Total Bypass Cap. (cfs)
FGP-1836W	16 x 33 to 21 x 39	NA	2.3	1.6	6.5	0.2	6.7
FGP-24W	22 x 22 to 26 x 26	NA	2.2	1.5	5.8	0.1	5.9
FGP-2436W	22 x 33 to 28 x 38	NA	3.4	2.0	7.5	0.2	7.7
FGP-2436WE	22 x 35 to 28 x 39	NA	3.4	2.0	7.5	0.2	7.7
FGP-28W	26 x 26 to 30 x 30	NA	2.2	1.5	5.8	0.1	5.9
FGP-36W	30 x 33 to 39 x 42	NA	4.6	2.4	8.6	0.1	8.7

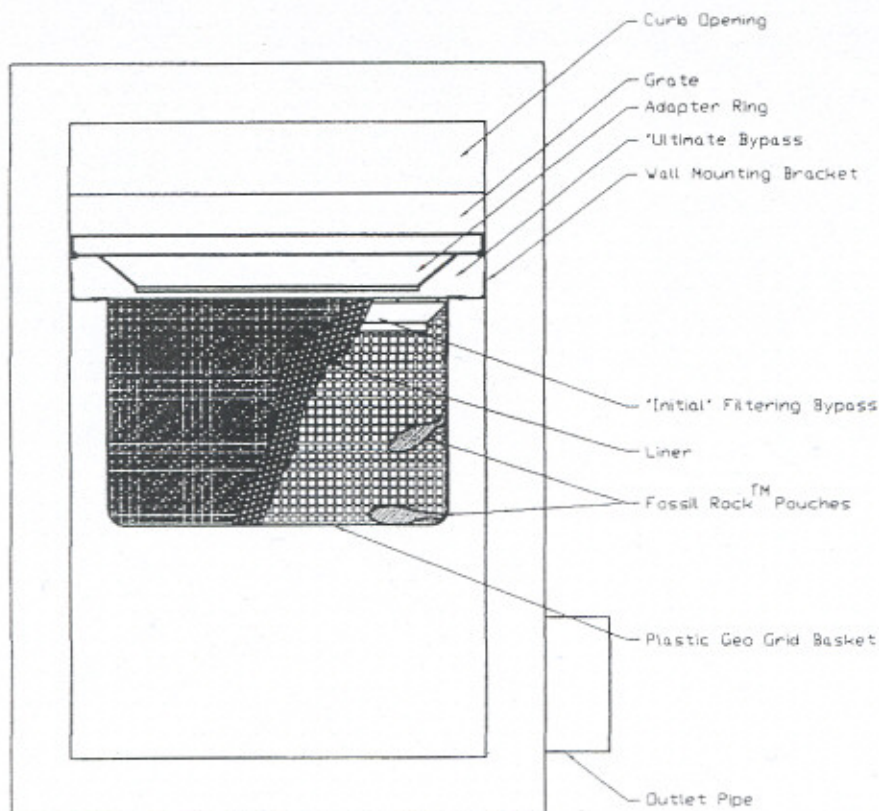
NOTES:

1. Storage capacity reflects 80% of maximum solids collection prior to impeding filtering bypass.
2. Filtered flowrate includes a safety factor of 2.
3. Flo-Gard+Plus Catch Basin Filter inserts are available in the standard sizes (see above) or in custom sizes. Call for details on custom size inserts.
4. Flo-Gard+Plus filter inserts should be used in conjunction with a regular maintenance program. Refer to manufacturer's recommended maintenance guidelines.

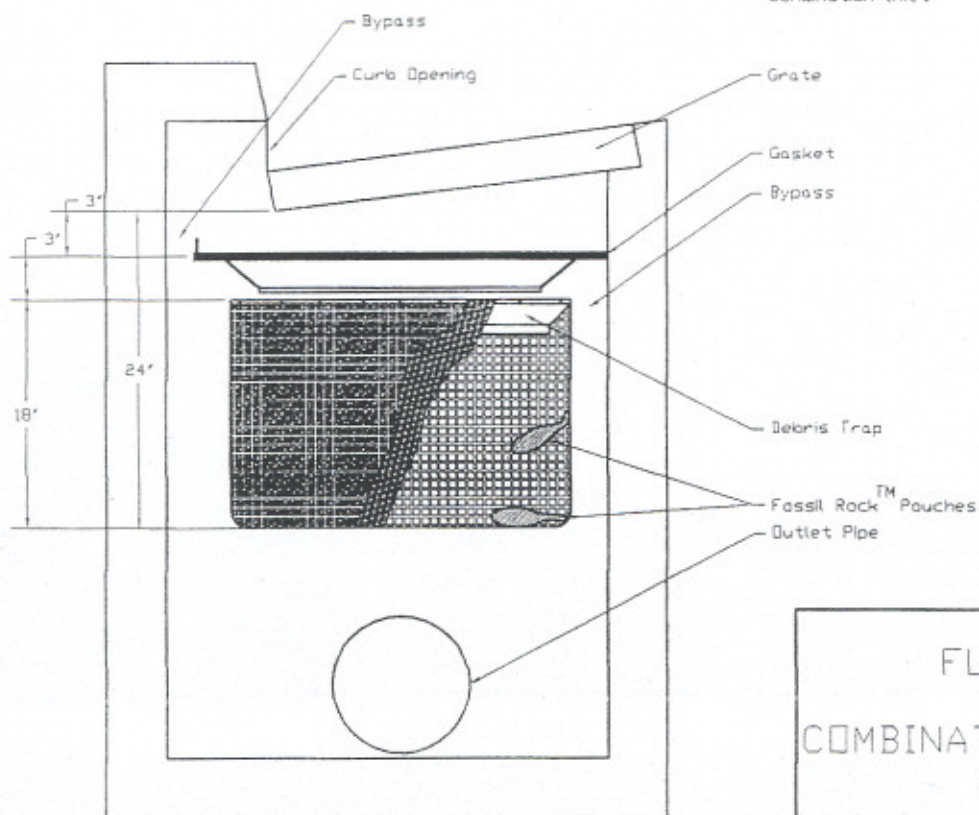
US PATENT PENDING

FLO-GARD™ +PLUS
CATCH BASIN FILTER INSERT
 (Wall Mount)
FLAT GRATED INLET
SHEET 1 OF 2

KriStar Enterprises, Inc., Santa Rosa, CA (800) 579-8819



FRONT VIEW



SIDE VIEW

FLOGARD+PLUS™
 (WALL MOUNT)
 COMBINATION INLET FILTER
 SHEET 2 OF 2

KriStar Enterprises, Inc., Santa Rosa, CA
 (800) 579-8819



Flo-Gard Plus Flow Sizing Chart

Frame Mount Models

Model No.	Inlet ID (in x in)	Grate OD (in x in)	Solids Storage Cap. (cu ft)*	Filtered Flow (cfs)	Initial Bypass Cap. (cfs)**	Secondary Bypass Cap. (cfs)***	Total Bypass Cap. (cfs)
FGP-12F	12 x 12	14 x 14	0.3	0.4	2.7	0.1	2.8
FGP-1530F	15 x 30	16 x 36	2.3	1.6	6.5	0.4	6.9
FGP-16F	16 x 16	18 x 18	0.8	0.7	4.4	0.2	4.7
FGP-18F	18 x 18	20 x 20	0.8	0.7	4.4	0.2	4.7
FGP-1822F	20 x 24	18 x 22	2.1	1.4	5.6	0.3	5.9
FGP-1824F	16 x 22	20 x 24	1.5	1.2	4.8	0.2	5.0
FGP-1836F	18 x 36	18 x 40	2.3	1.6	6.5	0.4	6.9
FGP-2024F	20 x 24	22 x 24	1.2	1.0	5.6	0.3	5.9
FGP-21F	22 x 22	24 x 24	2.2	1.5	5.8	0.3	6.1
FGP-2142F	21 x 42	26 x 42	4.3	2.4	8.7	0.4	9.1
FGP-24F	24 x 24	26 x 26	2.2	1.5	5.8	0.3	6.1
FGP-2436F	24 x 36	24 x 40	3.4	2.0	7.5	0.4	8.0
FGP-2445F	24 x 45	26 x 47	4.4	2.4	8.9	0.4	9.3
FGP-2448F	24 x 48	26 x 48	4.4	2.4	8.9	0.4	9.3
FGP-28F	28 x 28	30 x 30	2.2	1.5	5.8	0.5	6.3
FGP-30F	30 x 30	30 x 34	3.6	2.0	7.5	0.5	8.1
FGP-36F	36 x 36	36 x 40	4.6	2.4	8.6	0.5	9.1
FGP-3648F	36 x 48	40 x 48	6.8	3.2	10.8	0.6	11.5
FGP-48F (2 pc)	48 x 48	48 x 52	9.5	3.9	12.5	0.7	13.2

Wall Mount Models

Model No.	Inlet ID (in x in)	Grate OD (in x in)	Solids Storage Cap. (cu ft)*	Filtered Flow (cfs)	Initial Bypass Cap. (cfs)**	Secondary Bypass Cap. (cfs)***	Total Bypass Cap. (cfs)
FGP-1836W	16 x 33 to 21 x 39	NA	2.3	1.6	6.5	0.2	6.7
FGP-24W	22 x 22 to 26 x 26	NA	2.2	1.5	5.8	0.1	5.9
FGP-2436W	22 x 33 to 28 x 38	NA	3.4	2.0	7.5	0.2	7.7
FGP-2436WE	22 x 35 to 28 x 39	NA	3.4	2.0	7.5	0.2	7.7
FGP-28W	26 x 26 to 30 x 30	NA	2.2	1.5	5.8	0.1	5.9
FGP-36W	30 x 33 to 39 x 42	NA	4.6	2.4	8.6	0.1	8.7

*Allows 80% fill height

**Based on 5.5" max. head

***Based on max. head at height of overflow weir

Curb Mount Models

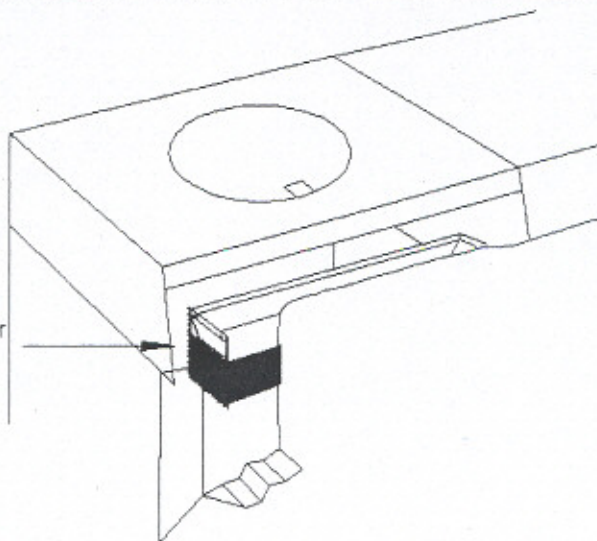
Model No.	Inlet width (in)	Grate OD (in x in)	Solids Storage Cap. (cu ft)*	Filtered Flow (cfs)	Initial Bypass Cap. (cfs)**	Secondary Bypass Cap. (cfs)***	Total Bypass Cap. (cfs)
FGP-24CI	24	NA	0.9	0.8	5.5	0.1	5.6
FGP-30CI	30	NA	1.1	1.0	6.5	0.2	6.7
FGP-36CI	36	NA	1.4	1.2	7.5	0.2	7.7
FGP-42CI	42	NA	1.6	1.4	8.6	0.2	8.8
FGP-48CI	48	NA	1.9	1.5	9.6	0.3	9.9
FGP-5CI	60	NA	2.3	1.8	11.3	0.3	11.6
FGP-6CI	72	NA	2.8	2.2	13.4	0.4	13.8
FGP-7CI	84	NA	3.2	2.5	15.5	0.4	15.9
FGP-8CI	96	NA	3.7	2.9	17.5	0.5	18.0
FGP-10CI	120	NA	4.6	3.5	21.3	0.6	21.9
FGP-12CI	144	NA	5.6	4.2	25.4	0.8	26.2
FGP-14CI	168	NA	6.5	4.9	29.2	0.9	30.1
FGP-16CI	192	NA	7.5	5.6	33.4	1.0	34.4
FGP-18CI	216	NA	8.3	6.2	37.2	1.1	38.3
FGP-21CI	252	NA	9.7	7.2	43.0	1.3	44.3
FGP-28CI	336	NA	13.0	9.5	56.8	1.8	58.5

*Allows 80% fill height

**Based on 5.5" max. head

***Based on max. head at height of overflow weir

Flo-Gard+Plus Filter
Installed



Model No.	Inlet width (in)	Grate OD (in x in)	Solids Storage Cap. (cu ft)	Filtered Flow (cfs)	Initial Bypass Cap. (cfs)	Secondary Bypass Cap. (cfs)	Total Bypass Cap. (cfs)
FGP-24CI	24	NA	0.9	0.8	5.5	0.1	5.6
FGP-30CI	30	NA	1.1	1.0	6.5	0.2	6.7
FGP-36CI	36	NA	1.4	1.2	7.5	0.2	7.7
FGP-42CI	42	NA	1.6	1.4	8.6	0.2	8.8
FGP-48CI	48	NA	1.9	1.5	9.6	0.3	9.9
FGP-5CI	60	NA	2.3	1.8	11.3	0.3	11.6
FGP-6CI	72	NA	2.8	2.2	13.4	0.4	13.8
FGP-7CI	84	NA	3.2	2.5	15.5	0.4	15.9
FGP-8CI	96	NA	3.7	2.9	17.5	0.5	18.0
FGP-10CI	120	NA	4.6	3.5	21.3	0.6	21.9
FGP-12CI	144	NA	5.6	4.2	25.4	0.8	26.2
FGP-14CI	168	NA	6.5	4.9	29.2	0.9	30.1
FGP-16CI	192	NA	7.5	5.6	33.4	1.0	34.4
FGP-18CI	216	NA	8.3	6.2	37.2	1.1	38.3
FGP-21CI	252	NA	9.7	7.2	43.0	1.3	44.3
FGP-28CI	336	NA	13.0	9.5	56.8	1.8	58.5

NOTES:

1. Storage capacity reflects 80% of maximum solids collection prior to impeding filtering bypass.
2. Filtered flow rate includes a safety factor of 2.
3. Flo-Gard+Plus Catch Basin Filter Inserts are available in the standard sizes (see above) or in custom sizes. Call for details on custom size inserts.
4. Flo-Gard+Plus filter inserts should be used in conjunction with a regular maintenance program. Refer to manufacturer's recommended maintenance guidelines.

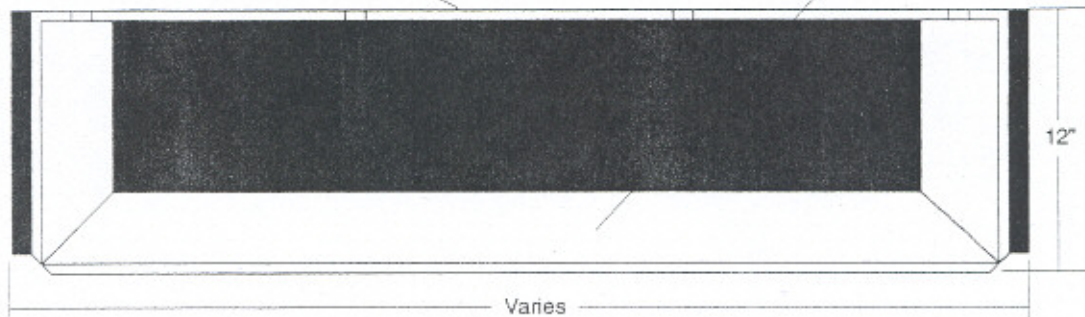
US PATENT PENDING -

FLO-GARD™ +PLUS CATCH BASIN FILTER INSERT (Curb Mount) FLAT GRATED INLET SHEET 1 OF 2

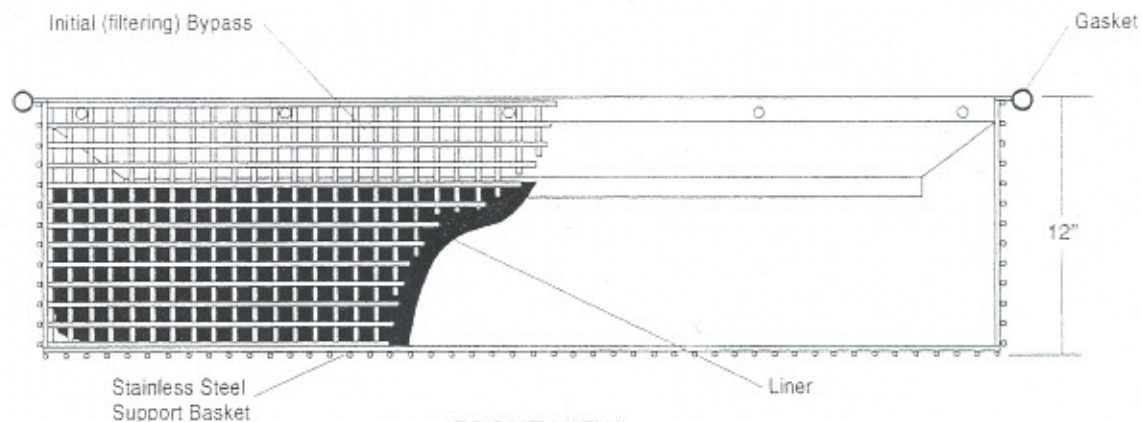
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Attach to catch basin wall or
wall mount bracket assembly

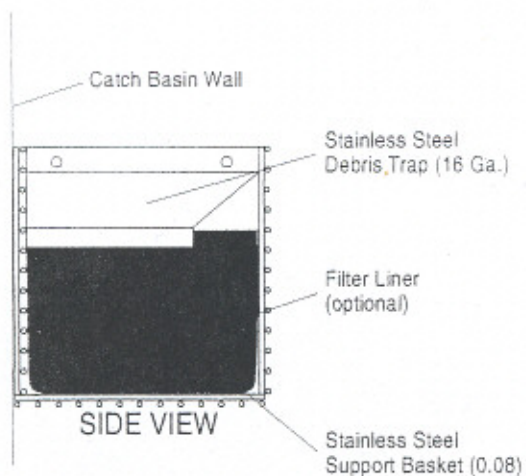
Debris Trap
(16 Ga. stainless steel)



TOP VIEW



FRONT VIEW

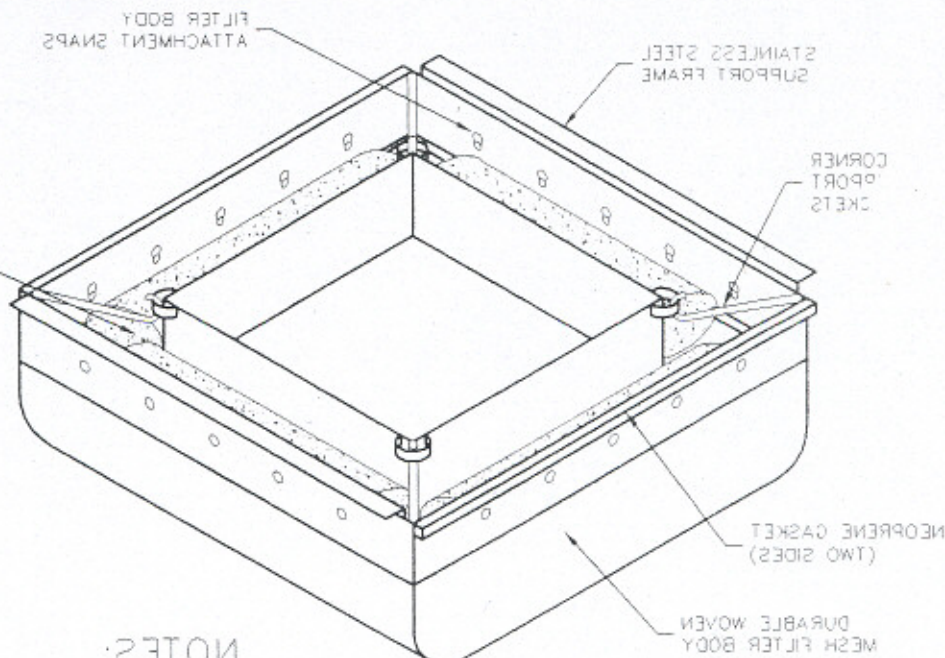


SIDE VIEW

FLOGARD+PLUS™
CATCH BASIN FILTER INSERT
(CURB OPENING STYLE)
SHEET 2 OF 2

KriStar Enterprises, Inc., Santa Rosa, CA (800) 579-8819

MODULAR DESIGN FOR EASY REPLACEMENT OF FILTER COMPONENTS



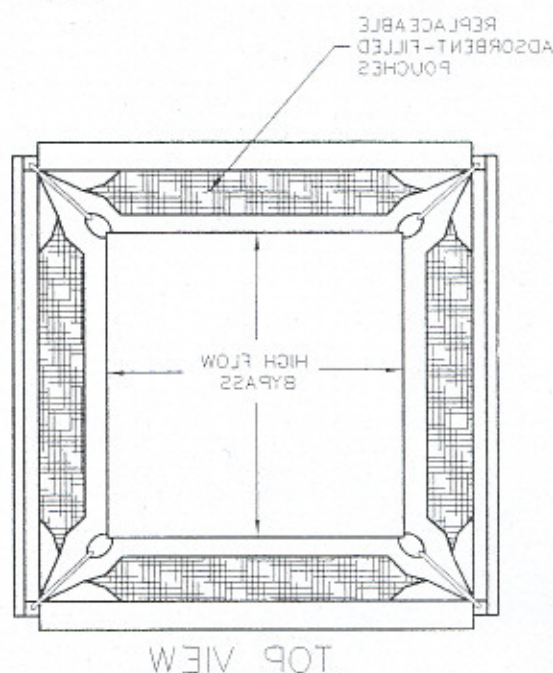
NOTES:

1. Flogard™ Filter body is prefabricated from polypropylene woven monofilament geotextile.
2. All metal components shall be stainless steel (Type 304).
3. Refer to application chart for catch basin and filter sizing.
4. Filter medium shall be Fossil Rock™, installed and maintained in accordance with manufacturer's recommendations.
5. Refer to Manufacturer's recommendations for maintenance program.
6. Flogard™ inserts may be installed (without adsorbent pouches) during course of construction as a sedimentation control device. After construction, remove sediment and install adsorbent pouches.

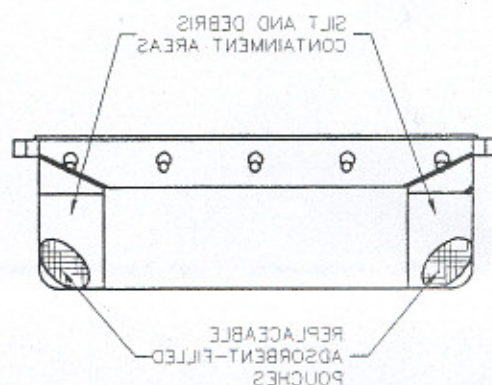
APPLICATION CHART*

MODEL NO.	Inlet I.D.	Grate O.D.	COMMENTS
FF-180	18" x 18"	18" x 18"	GRADED INLET
FF-180	18" x 18"	20" x 20"	GRADED INLET
FF-1836SD	18" x 36"	18" x 40"	GRADED INLET
FF-1836DCO	18" x 36"	18" x 40"	COMBINATION INLET
FF-24D	24" x 24"	24" x 24"	GRADED INLET
FF-2436D	24" x 36"	24" x 40"	GRADED INLET
FF-R24D	24" Dia.	24" Dia.	CIRCULAR INLET
FF-24DCO	24" x 24"	18" x 24"	COMBINATION INLET
FF-2436DCO	24" x 36"	24" x 40"	COMBINATION INLET

* Flogard™ Filter inserts are designed to fit catch basins with approximate dimensions shown.



TOP VIEW



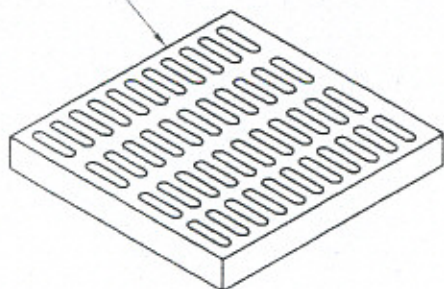
SECTION VIEW

FLOGARD™
CATCH BASIN INSERT
(SHEET 1 OF 2)
Kristar Enterprises, Inc., Santa Rosa, CA
(800) 259-8818

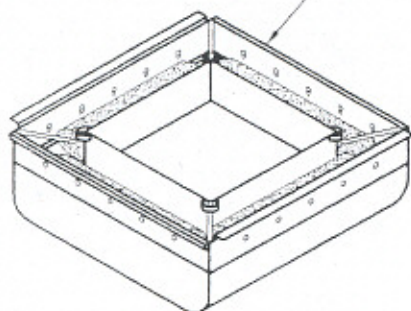
PATENT PENDING

NOTES:

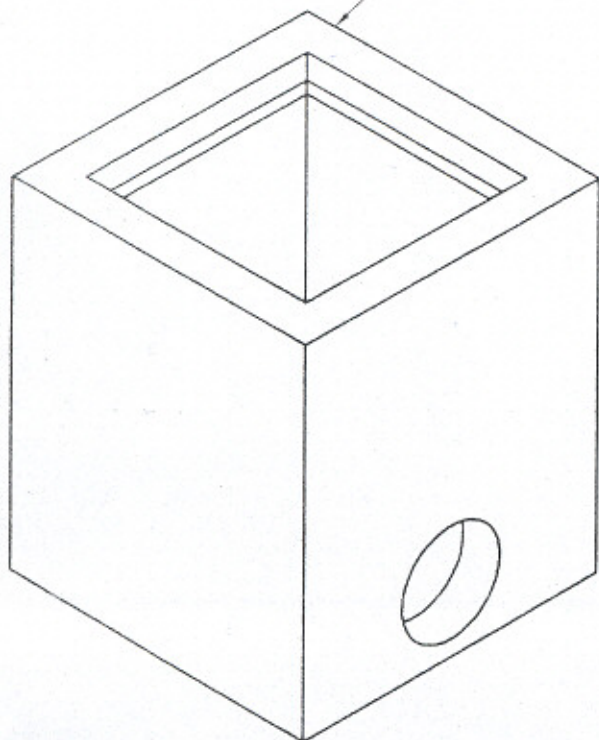
INLET GRATE



FLOGARD™ INSERT
(SEE APPLICATION CHART)



CATCH BASIN



1. FloGard™ Filter body is prefabricated from polypropylene woven monofilament geotextile.
2. All metal components shall be stainless steel (Type 304).
3. Refer to application chart for catch basin and filter sizing.
4. Filter medium shall be Fossil Rock™ installed and maintained in accordance with manufacturer recommendations.
5. Refer to Manufacturer's recommendations for maintenance program.
6. FloGard™ inserts may be installed without adsorbent pouches during course of construction as a sedimentation control device. After construction, remove the sediment and install the adsorbent pouches.

APPLICATION CHART*

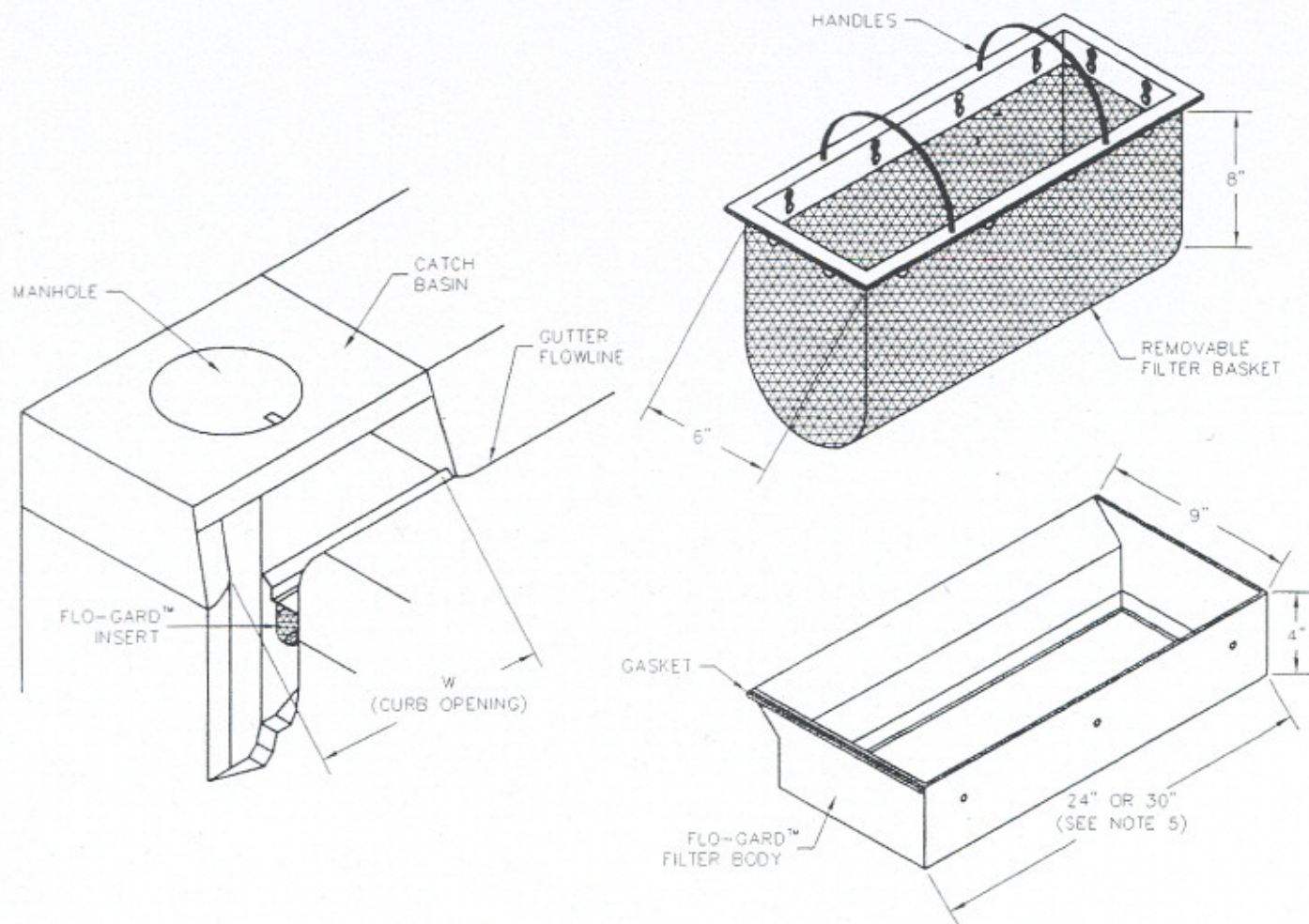
MODEL NO.	Inlet I.D.	Grate O.D.	COMMENTS
FF-16D	16" x 16"	18" x 18"	GRATED INLET
FF-18D	18" x 18"	20" x 20"	GRATED INLET
FF-1836SD	18" x 36"	18" x 40"	GRATED INLET
FF-1836DGO	18" x 36"	18" x 40"	COMBINATION INLET
FF-24D	24" x 24"	26" x 26"	GRATED INLET
FF-2436D	24" x 36"	24" x 40"	GRATED INLET
FF-RF24D	24" Dia.	25" Dia.	CIRCULAR INLET
FF-24DGO	24" x 24"	18" x 26"	COMBINATION INLET
FF-2436DGO	24" x 36"	24" x 40"	COMBINATION INLET

* FloGard Filter™ inserts are designed to fit catch basins with approximate dimensions shown.

FLOGARD™ CATCH BASIN INSERT INSTALLATION DETAIL

(SHEET 2 OF 2)
KriStar Enterprises, Inc., Santa Rosa, CA
(800) 579-8819

PATENT PENDING



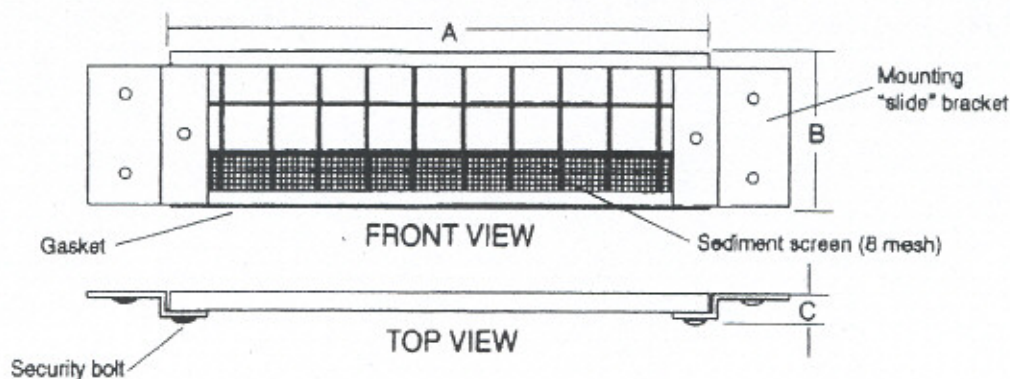
NOTES:

1. "Flo-Gard" filter body shall be manufactured from petroleum resistant fiberglass which meets or exceeds PS 15-69.
2. All metal components shall be stainless steel (Type 304).
3. Removeable filter basket shall be constructed from durable polypropylene woven monofilament geotextile.
4. "Flo-Gard" filter body shall be secured to catch basin wall with expansion anchor bolts and washer. (See detail)
5. "Flo-Gard" inserts are available in 24" or 30" length sections and may be installed in various combinations (end-to-end) to fit most catch basin widths.
6. Filter basket may be removed through curb opening for ease of maintenance.
7. Filter medium shall be Fossil Rock,™ in disposable pouches, installed and maintained in accordance with manufacturer recommendations.

FLOGARD™ SUPPLEMENTAL INSERT (CURB OPENING INLET)

KriStar Enterprises, Inc., Santa Rosa, CA
(800) 579-8819

PATENT PENDING



APPLICATION CHART

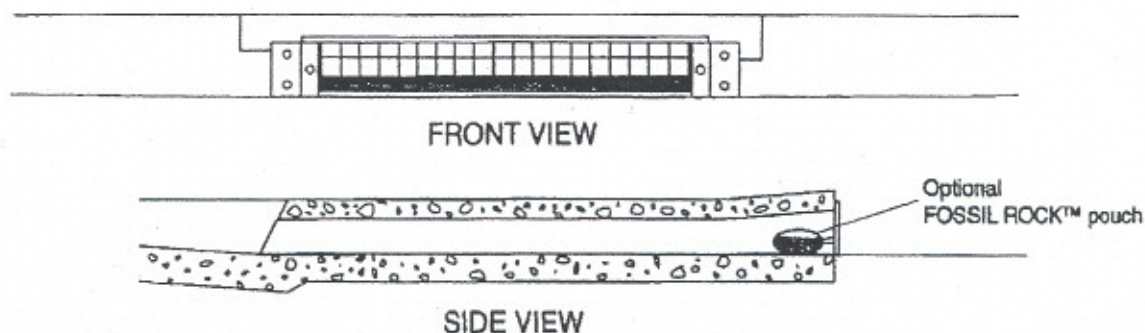
MODEL NO.	A	B	C
FG-TDG24	32.00"	6.00"	.75"
FG-TDG36	44.00"	6.00"	.75"
FG-TDG42	50.00"	6.00"	.75"
FG-TDG48	56.00"	6.00"	.75"
FG-TDG60	68.00"	6.00"	.75"
FG-TDG-CUST	As req'd	As req'd	

NOTES:

1. All metal components shall be constructed from stainless steel (Type 304).
2. FloGard™ Trash and Debris Guard shall be mounted to the face of curb, across the drain opening. Mounting brackets shall be secured to the face of curb using two 3/8" x 2-1/2" stainless steel expansion anchors and tamper resistant bolts.
3. Mounting brackets shall be supplied with tamper resistant stainless steel security bolts.
4. Refer to application chart for standard heights and widths for FloGard™ Trash and Debris Guard. Custom sizes are available upon request.
5. FloGard™ Trash and Debris Guard is supplied with a removable (8 mesh) sediment screen. Alternate size sediment screens may be specified to retain the particle size anticipated for each specific site.
6. FloGard™ Trash and Debris Guard may be specified with Fossil Rock™ filter medium pouch for the collection of oil and grease.
7. FloGard™ Trash and Debris Guard should only be used on sites that incorporate a comprehensive maintenance program that includes regular cleaning and sweeping.

TYPICAL INSTALLATION

Parkway Culvert



FLOGARD™ TRASH & DEBRIS GUARD for CATCH BASINS

KriStar Enterprises, Inc., Santa Rosa, CA (800) 579-8819

U.S. PATENT PENDING

**GENERAL SPECIFICATIONS FOR FLO-GARD
AND FLO-GARD "PLUS"
CATCH BASIN INSERTS**

Scope:

This specification describes a **Catch Basin Filtration Device** that removes sediment, debris, trash and petroleum hydrocarbons (oil and grease) from water flowing into the drainage inlets during low flows (first flush) without impeding the inlet's maximum design flow. Hydraulic bypass calculations shall be supplied upon request.

The filtration device shall incorporate a silicate adsorbent filter medium capable of collecting and containing non-soluble pollutants including, but not limited to, petroleum hydrocarbons (oil and grease). Filter medium shall be contained in separate removable containers that can easily be replaced without removing the filter liner. Filtration device shall not rely on collected sediment, debris, trash or filter liner as the medium for hydrocarbon collection.

High capacity filtration devices shall incorporate a debris trap, designed to retain floatable pollutants during high flow periods and both an initial filtering bypass for moderate flows and an ultimate bypass for peak design flows. The installed device "shall not" impede drainage inlet's peak design flow prior to or after the device has reached its pollutant storage capacity.

Material Properties:

Filtration device support frame and hardware shall be manufactured from Type 304 stainless steel. It shall be designed to support maximum anticipated loads from the collected pollutants and water. Structural calculations or laboratory tests shall be supplied upon request.

Field modifications, welding or painting of the device shall not be allowed.

Device shall incorporate a removable filter liner made from a woven polypropylene monofilament geotextile with a clean flow rate of 140 gallons per minute (gpm) per square foot. The use of a non-woven geotextile filter liner shall not be allowed.

Filter medium shall be hydrophobic silicate adsorbent material treated to attract and retain petroleum hydrocarbons and other non-soluble pollutants. It shall be non-biodegradable and non-leaching and contain no hazardous ingredients as defined by the

U.S. Environmental Protection Agency (EPA), U.S. Occupational Safety and Health Administration (OSHA), and the World Health Organization (WHO).

Installation:

Installation of filtration device shall not require extensive modification of the catch basin and shall be performed by a manufacturer-approved installation contractor. Installation contractor shall be licensed and insured in accordance with agency requirements.

Filtration devices installed into grated, or combination grate with curb opening inlets shall be either supported by resting the support brackets on the grate bearing ledge (installed without the use bolts or other anchoring devices) or mounted to the catch basin wall with easily removable separate wall mount brackets to allow for quick access to the piping system in the event of an emergency.

Devices for curb opening style inlets (no grate) shall be installed across the entire width of the curb opening and shall be secured to inlet wall, across and beneath the curb opening, using corrosion-resistant anchors (Type 304 stainless steel). The use of chains or cable to secure the device shall not be allowed.

Filtration devices shall be installed in such a manner as to direct all flows into the device. Distance (gaps) between the inlet wall and the device shall not exceed 1 inch. Gaps of less than 1 inch shall be sealed with a flexible weatherproof sealant, as approved by agency.

Installation contractor shall supply agency (engineer) with an installation record, denoting the date of installation, drainage inlet location, type of drainage inlet and type and/or size of filtration device.

**BEST MANAGEMENT PRACTICE (BMP) FOR THE REMOVAL
OF PETROLEUM HYDROCARBONS, SILT AND DEBRIS
FROM STORMWATER RUNOFF THROUGH THE USE OF
CATCH BASIN INSERT (CBI) FILTRATION**

The concept of Stormwater Catch Basin Insert (CBI) Filtration:

Essentially, catch basin filtration is the placement of devices that contain a filtering medium (a sorbent) and a silt and debris containment area just under the grates of the stormwater system's catch basins. Placement of the devices at the entrance of the storm drain system provides the capability of removing all manner of pollutants from the runoff before they even enter the drainage system and have a chance to go underground and become saturated or emulsified. The water runoff flows into the inlet, through the filter where the sorbent's target contaminants, sediment and debris are removed, and then into the drainage system. The devices must be capable of effectively filtering the first flush (first 15 minutes) of a rain event and provide an overflow capability sufficient to prevent the system from becoming clogged. The sorbent filter medium must be an inert blend of minerals that contain non-hazardous ingredients, as defined by the Federal EPA, OSHA and WHO (World Health Organization). Further, the medium should be non-leaching, contain no reactive chemicals, be non-carcinogenic, non-biodegradable, non-toxic, non-inflammable and non-injurious to asphalt, cement, carpet, tile, soil or plant life.

Target Pollutants:

The Catch Basin Filters should have a capability of capturing and retaining petroleum hydrocarbons and silt and debris. The sorbent's primary target contaminants are petroleum hydrocarbons, to include most oil-based products generated by motor vehicles powered by fossil fuel or lubricated with any of the fossil fuel by-products. These include gasoline, oil, grease, some anti-freezes, and other such products plus other types of contaminants (i.e. heavy metals) that may become attached, through incidental capture, to the hydrocarbon, silt and debris. The structure of the device should be capable of capturing and retaining silt, debris, litter, vegetation and other pollutants that may be borne by the runoff. The device should have at least one bypass capability in the event of heavy flows but yet be capable of retaining floatables.

Current Technology:

Of the catch basin insert filtration systems currently on the market that target petroleum hydrocarbons, the Flo-Gard and Flo-Gard Plus, products of KriStar Enterprises of Sonoma County, California, are the most prominent. The concept of catch basin filtration, as with the Flo-Gard and Flo-Gard Plus, introduced a concept that was unique enough to qualify for a U.S. patent. Prior to the introduction of Flo-Gard and its predecessors, the leading technology for separating oil from water runoff was large underground precast concrete oil/water separators. They were expensive to purchase and install and could be used only on new construction projects. Generally, because the devices were underground (and out of sight), inspection was very difficult, maintenance expensive and virtually nonexistent. Consequently, they were usually forgotten and any pollutants collected were either transported to the receiving body of water or remained in the system to become emulsified into harmful nutrients and then flushed to the receiving body of water with a future rain event. Also, absent regular maintenance, and if standing water is allowed, water-bearing systems can become a habitat for bacteria and insects (mosquitoes).

Flo-Gard and Flo-Gard Plus, on the other hand, cost but a fraction of the concrete units to purchase and installation usually consists of removing the inlet grate, inserting the filter and replacing the grate. They can be used in both new and post-construction projects; visual inspection is simple; and maintenance can be performed usually in a matter of minutes.

Flo-Gard and Flo-Gard Plus are available off the shelf for common size/shape inlets or can be fabricated for non-standard inlets. Models of the devices are available for square, rectangular, round and curb or

combination inlets and trench drains. According to the manufacturer, a device to fit almost any situation is possible.

Device Construction:

The catch basin insert (CBI) filtration system structure should be constructed so as to cause the water to flow through the unit's filter medium (sorbent) and be of a fit that prevents leakage around the exterior of the filter. The device should have sediment and debris removal capabilities and include a containment area. To prevent corrosion and the release of oxidized metals into the system, all of the device's construction materials should be of high-density polyethylene (HDPE), petroleum-resistant fiberglass, stainless steel, or woven polypropylene monofilament geotextile. *The use of galvanized steel should not be allowed.* The CBI should provide at least one bypass in the event of high flows; yet should have a built-in capability of retaining floatables during bypass.

Recommended Effectiveness:

Manufacturers of Catch Basin Insert Filtration Systems, acceptable for installation, should be able to produce proof of appropriate laboratory or field testing of both the installed sorbent and the structure itself. The tests should be able to demonstrate a capability of removing petroleum hydrocarbons and for containing other pollutants that enter the inlet and that the device will not clog up the drainage system.

Applicability of Devices to EPA's NPDES and SWPPP's:

The Federal EPA's NPDES program, designed to control the discharge of pollutants to waters of the United States, cites a definition of oil/water separator as, *"A device installed usually at the entrance to a drain, which removes oil and grease from water flows entering the drain"*.

CBI's acceptable for installation in petroleum hydrocarbon-generating areas should fit the federal EPA's definition of oil/water separator (above). Flo-Gard and Flo-Gard Plus meet the EPA description plus they meet the EPA mandate of BAT (Best Available Technology) while being "economically feasible". Based on the foregoing, Flo-Gard and Flo-Gard Plus are suitable for inclusion as a BMP in local SWPPP'S. Plus, they have an added capability of removing sediment and debris from the runoff.

Recommended Uses:

Catch Basin Insert Filtration Systems should be required for all locations where petroleum hydrocarbons and sediment and debris are major sources of pollution to stormwater runoff and the water can be directed into a drainage inlet. Employee and customer parking lots, corporation yards, equipment service areas, toll-gates and refueling facilities are prime examples of such locations. They should be required for new construction and whenever a permit is issued to renovate or remodel an existing location.

Inspection and Maintenance Procedures:

Each inspection of the installed filtration systems should include broom sweeping the area around the inlet, removal of the inlet grate, removal of trash and debris and visual inspection of the filter and the installed sorbent.

The sorbent pouches should be removed, cleaned and inspected and, if the media is more than 50% coated, new pouches should be installed. The device should then be returned to its normal operating configuration, the inlet grate replaced and another broom cleanup completed. The exposed filter media and collected debris should be placed in a DOT-approved drum and disposed of in accordance with local agency requirements.

Follow-On Maintenance:

Because of past abuses of installed stormwater treatment devices, some governmental agencies within California, that accept Flo-Gard or Flo-Gard Plus as a BMP for stormwater runoff, are now requiring proof of a follow-on maintenance program. Other states are now following California's lead. It is recommended that the agencies require proof of either a contractor maintenance program or that the landowners certify that they will provide maintenance, in which case the installations would be made a component of periodic inspection tours.

KriStar Enterprises, the manufacturers of Flo-Gard and Flo-Gard Plus, provide a comprehensive maintenance program that not only provides for maintenance of all stormwater filtration systems (to include other than Flo-Gard) but notifies the owner and the appropriate oversight agency when maintenance has been performed.

Limitations:

Limitations for the products include a lack of recurring maintenance and installation in unsuitable sites or areas. Regarding the former, the efficiency of any filtration system is in direct proportion to the caliber of its maintenance program. A lack of care can be a limitation for any stormwater filtration system. Next, installation of the units in unsuitable areas such as downstream from a sandpile or beneath large trees where needles or leaves can plug up the system is a serious limitation.

Recommendations:

1. That Catch Basin Insert Filtration systems such as Flo-Gard and Flo-Gard Plus be included as a BMP for preventing pollution of stormwater runoff by petroleum hydrocarbons, silt and debris.
2. That new and post-construction projects in areas subject to the generation of petroleum hydrocarbons, silt and debris be surveyed as potential sites for installation of Catch Basin Insert Filtration Systems.

ACCEPTABLE CRITERIA FOR AN EFFECTIVE CATCH BASIN INSERT (CBI) FILTRATION SYSTEM

Catch basin filtration is the placement of catch basin insert (cbi) devices that contain a filtering medium (a sorbent) just under the grates of the stormwater system's catch basins. The water runoff flows into the inlet, through the filter, where pollutants and contaminants are removed, and then into the drainage system.

Each system may be used independently (stand alone) or **be a component in a Treatment Train** and combined with other technologies such as underground oil/water separators or filters, grassy swales, settling ponds and the like.

The devices must be capable of effectively filtering the "*first flush*" of stormwater from a rain event and provide an overflow capability sufficient to prevent the system from becoming clogged. The sorbent filter medium must be a non-leaching inert blend of minerals that contain non-hazardous ingredients, as defined by the Federal EPA, OSHA and WHO (World Health Organization).

The system must be capable of removing and containing sediment, debris, trash and petroleum hydrocarbons (oil and grease) from the runoff. Plus, it should remove heavy metals that have become attached to silt and sediment through *Incidental Capture*.

A Flo-Gard or Flo-Gard Plus catch basin insert and its Fossil Rock sorbent comprise a catch basin filtration system and satisfy the foregoing criteria. Flo-Gard and Flo-Gard Plus are cost-effective alternatives to large underground oil/water separators and other expensive devices – or they may be used as a component in a *Treatment Train*.

They are adaptable to both new and post-construction, are easy (and economical) to install, inspect and maintain and are available in a variety of models, sizes and shapes to fit most drainage systems and structures.

Their most obvious applications are motor vehicle parking lots, corporation yards, service stations, washracks and the like where debris and petroleum hydrocarbons are problems. These products help the user conform to the EPA Clean Water Act.